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Clinical Practice Guidelines

Evidence-based guidelines for dental implants in edentulism

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Dr Chan Siew Luen on behalf of the Workgroup for the AMS-MOH Clinical Practice Guidelines on Dental Implants in Edentulism

Traditionally, much of clinical practice is based on expert opinion or the collective opinion of a group of experts, such as a consensus conference. However, such guidelines are often biased. Guidelines that are evidence-based will be of greater value to practitioners as results will tend to be more reproducible given the same set of circumstances.

Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.[1] They are not meant to be clinical protocols that dictate a management plan for a specific patient. The final decision as to what treatment is best for a particular patient still rests on the judgment of the practitioner, based on the clinical data presented by the patient and availability of various treatment options.

There are different approaches to developing clinical practice guidelines. This set of guidelines on dental implants was developed by methods based on the protocols of the Scottish Intercollegiate Guidelines Network.[2]

In the past few years, we noted a significant increase in interest by patients and dentists in the use of dental implants to replace missing teeth. There has also been much variation of the original protocol of dental implantology that had been advocated by Per Ingvar Branemark.[3] As such, a need arose for a set of clinical practice guidelines to help dentists evaluate the various types of dental implant treatment available for optimal management of their patients. The recommendation from these guidelines are published in this issue of the SDJ.

This set of guidelines is not meant to be comprehensive in scope. The workgroup identified several clinical questions that we deemed pertinent and reviewed the literature on them. The evidence was collated and critically appraised and recommendations were made accordingly. These recommendations were then graded based on the level of the evidence evaluated. A draft was then circulated to the respective specialist societies for feedback before it was published.

While the dentists in the workgroup did the literature review and drafted the initial recommendations, it was the Health Technology Assessment Branch of the Ministry of Health that rigorously checked the appropriateness of the recommendations and their grading against the publications reviewed. With this approach, we are confident that these guidelines are scientifically rigorous.

As more research is done, more information may arise that may impact the relevance of some recommendations. As such, these guidelines should be used with a consideration of new evidence after its publication.

Workgroup members

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Academy of Medicine—Ministry of Health Clinical Practice Guidelines: Dental Implants in Edentulism

The Academy of Medicine Singapore (AMS) and Ministry of Health (MOH) have published clinical practice guidelines on Dental Implants in Edentulism to provide dental practitioners and patients in Singapore with evidence-based guidance on dental implants in edentulism. This article reproduces the introduction and executive summary (with recommendations from the guidelines) from the AMS-MOH clinical practice guidelines on Dental Implants in Edentulism, for the information of SDJ readers.

Chapters and page numbers mentioned in the reproduced extract refer to the full text of the guidelines, which are available from the Ministry of Health website: http://www.moh.gov.sg/content/moh_web/healthprofessionalsportal/dentists/guidelines/cpg_dental/2012/cpgden_dental_implants_in_edentulism.html. For the levels of evidence (1^{++} to 4) and the grades of recommendation (A-D and Good Practice Points or GPP), refer to the Dental Implant CPG Booklet, which can be downloaded from the website mentioned previously.

The recommendations should be used with reference to the full text of the guidelines.

Introduction

Objectives and scope of guideline

Dental implants are fast becoming an integral part of dental practice in Singapore. Until recently, implant dentistry was not taught in the proper milieu of most dental schools. On the academic front there has been much research and publications on this subject with varying levels of rigour. As such, a set of evidence-based guidelines covering some areas of controversies was deemed beneficial to practicing dentists in Singapore. The guidelines are not to be viewed as a protocol, but provide a framework to:

- guide dental healthcare professionals in their quest to give evidence-based care to their patients;
- appraise the various implant treatment options available today based on published evidence in the literature.

Target group

These guidelines are intended for use by general dental practitioners, oral and maxillofacial surgeons, prosthodontists, periodontists and endodontists.

Guideline development

These guidelines have been produced by a committee comprising general dental practitioners, endodontists, oral and maxillofacial surgeons, orthodontists, periodontists and prosthodontists appointed by the Academy of Medicine Singapore and Ministry of Health. They were developed using the best available current evidence and expert opinion. The

workgroup formulated this clinical practice guideline by reviewing published international guidelines and current evidence available in the research and clinical practice literature. The grading system used in the guidelines is described in the Dental Implant CPG Booklet, which is available on the MOH website.

Assessing the evidence

In assessing the evidence, different study designs were considered including randomised controlled trials, cohort studies, case control studies, uncontrolled clinical trials and expert opinions. Best practice guidelines important in implant dentistry were also included.

Scope of guideline

The workgroup identified certain areas in the practice of implant dentistry in Singapore where variation exists among dentists. This guideline covers these identified areas. This guideline is not meant to be exhaustive in coverage of other aspects of implant dentistry or the management of edentulism with other treatment modalities. This guideline provides recommendations for the use of dental implants for management of edentulism in patients with compromised healing abilities and patients with deficient bone stock. It also provides recommendations for the choice of loading and placement protocols as well implant geometry and dimensions. It is hoped that this guideline will help dentists in making evidence based clinical decisions in their management of edentulism with dental implants.

Review of guidelines

Evidence-based clinical practice guidelines are only as current as the evidence that supports them. Users must keep in mind that new evidence could supersede recommendations in these guidelines. The workgroup advises that these guidelines be scheduled for review 5 years after publication, or if new evidence appears that requires substantive changes to the recommendations.

Executive summary of recommendations

Details of recommendations can be found in the main text at the pages indicated.

Dental implants in irradiated bone

C The implant team must work closely with the cancer team members such as the radiation oncologist, oral and maxillofacial surgeon, prosthodontist, otolaryngologists/head and neck surgeons, plastic surgeon, speech therapists, dietician and physiotherapist. Such a combined consultation will lead to optimal planning as addressing questions such as:

(a) Can bone from tumour resection be saved and reused in the same surgery?
(b) Can implants be placed prior or during the resection surgery?
(c) Expected healing outcome from multidisciplinary treatment plan (p. 11).

Grade C, Level 2+

D Patients who receive implants and who were treated with radiation more than 5 years ago should be treated with utmost care (p. 12).

Grade D, Level 2+

D The use of hyperbaric oxygen though controversial may be considered as an adjunct to promote healing in these patients (p. 12).

Grade D, Level 2+

C Placement of endosseous implants in patients with a history of head and neck radiation therapy may be performed by clinicians with experience and training in head and neck radiation therapy (p. 12).

Grade C, Level 2+

Dental implants in patients receiving oral bisphosphonates

C Patients who have received or are receiving oral bisphosphonates may undergo dental implant therapy with caution (p. 13).

Grade C, Level 2+

C Patients on oral bisphosphonate therapy have to be counselled about the potential risks and complications before proceeding with dental implant treatment (p. 13).

Grade C, Level 2+

C A minimum pre-surgical serum CTX (beta-crosslaps) value of 150 pg/ml is recommended before extractions and/or implant surgery in patients on oral bisphophonate therapy (p. 14).

Grade C, Level 2+

C Other non-invasive treatment alternatives must also be discussed with patients (pg 14).

Grade C, Level 2+

Dental implants in patients with controlled periodontal disease

C In patients who have been successfully treated for periodontal diseases and have lost teeth, dental implants can be used for tooth/teeth replacements. However, even well-maintained periodontal patients need to be informed of the higher than normal risks and potential for complications in dental implant therapy in the long-term (p. 16).

Grade C, Level 2+

GPP Patients with periodontal diseases should have their condition treated and well maintained before dental implants can be considered. Annual follow-up visits to their dentist are necessary to better maintain implants in patients with a history of treated periodontitis (p. 16).

GPP

Dental implants in smokers

C Smokers who undergo dental implant therapy are at higher risk of early implant failures and should be closely followed-up during the early healing phase of osseous integration (p. 17).

Grade C, Level 2+

C For smokers who undergo dental implant therapy, particular attention should be paid to complications such as peri-implantitis, marginal bone loss and bone graft healing as part of post-surgical implant care. Where possible, alternative prosthodontic treatment methods should be explored with such patients (p. 17).

Grade C, Level 2+

GPP Patients who are smokers can proceed with dental implant therapy provided they are warned about the higher risks of failures, especially early failures (p. 18).

GPP

GPP Smokers should be advised to stop smoking during the healing period and where possible prior to dental implant therapy and they should seek counselling help to stop the habit altogether (p. 18).

GPP

Narrow diameter implants

B Implants of diameters between 2.5 mm and 3.3 mm can be used predictably for mandibular overdenture retention (p. 19).

Grade B, Level 2++

GPP Due to lack of clinical data regarding implants of less than 2.5 mm in diameter (micro-implants), these implants are not recommended for routine treatment of edentulism (p. 19).

GPP

Extraction and replacement with an implant-supported prosthesis versus endodontic treatment and restoration of teeth with pulpal pathosis

A Patients with pulpal and/or periapical pathosis may be treated with either root canal therapy or extraction and replacement with an endosseous implant-supported dental prosthesis with similar survival rates (p. 20).

Grade A, Level 1+

D Both non-surgical root canal therapy followed by an appropriate restoration and single-tooth implant are acceptable treatment modalities for the treatment of abscessed teeth. The decision to treat a tooth endodontically or to replace it with an implant must be based on factors other than the treatment outcomes of the procedures themselves, such as medical history, caries, patients' preference and other socio-economic factors (p. 21).

Grade D, Level 3

Implant-supported versus tooth-supported fixed dental prosthesis

B For the fixed replacement of a single missing tooth, based on 5-year survival ourcomes, an implant-supported single crown or a tooth-supported fixed dental prosthesis are viable options. Other factors apart from survival rates should be taken into consideration when deciding on the choice of replacement (p. 23).

Grade B, Level 2++

GPP Patients should receive information that tooth replacements with fixed dental prosthesis or implants are associated with incidences of biological and technical complications (p. 23).

GPP

Dental implants in posterior maxilla with sinus bone grafting

B Implants may be placed in posterior maxillary grafted sinuses via the lateral approach (p. 25).

Grade B, Level 2++

B Implants may be placed in posterior maxillary grafted sinuses via the transalveolar approach (p. 25).

Grade B, Level 2++

C Rough surface/textured implants may be placed in grafted posterior maxillary sinuses with non-autogenous bone graft (p. 25).

Grade C, Level 2+

Implants in augmented ridges

C Implants may be placed in peri-implant defects (dehiscence and fenestration) treated with guided bone regeneration techniques (p. 27).

Grade C, Level 2+

GPP Localised defects in edentulous ridges should be carefully evaluated and grafting can be considered to optimise the outcome of implant treatment (p. 27).

GPP

C Implants may be placed in sites covered with resorbable membranes (p. 27).

Grade C, Level 2+

GPP Both resorbable and non-resorbable membranes can be considered when augmenting localised defects. Special attention however should be given to the manipulation and follow-up of patients who have undergone non-resorbable membrane application in the light of its higher complication rates (p. 27).

GPP

C Implants may be placed in atrophied ridges augmented by various techniques (other than onlay grafting) (p. 28).

Grade C, Level 2+

GPP Atrophic ridges should be carefully evaluated and different grafting options must be considered as we plan for implant rehabilitation in these situations. Implant positions must be carefully planned out in grafted atrophic ridges to ensure better, long-term implant survival rate. An optimal balance of load distribution, satisfactory aesthetics and functionality must be taken into consideration (p. 28).

GPP

C The efficacy of different grafting techniques in severely atrophic edentulous sites seem to be comparable. Apart from onlay grafting in severely resorbed maxillary areas which shows higher potential for failure and complications, the other techniques proved to be equally effective (p. 28).

Grade C, Level 2+

GPP Other augmentation options should be considered before choosing onlay grafting for severely resorbed maxillary edentulous sites (p. 28).

GPP

Connection of dental implants to natural teeth

D As the treatment of choice, a fixed dental prosthesis supported by osseointegrated implants should be connected to other osseointegrated implants, independent of natural teeth. Connection of osseointegrated implants to natural teeth via a fixed dental prosthesis may be done with adequate warning of a higher complication and failure rates (p. 29).

Grade D, Level 2+

D When implants are connected to natural teeth, rigid connection should be used, and only on teeth which are periodontally sound. Regular checks are necessary as mechanical complications and increased marginal bone loss may be expected around either implant or tooth. Modified connections retaining the rigid characteristics that have been proposed without long term results should not be used until more results are available (p. 29).

Grade D, Level 3

Placement protocol/timing

C Dental implants should be placed in healed sockets as the treatment of choice (p. 31).

Grade C, Level 2+

C Implants may be placed into fresh extraction sockets with the patient's understanding that the survival rate is lower than that placed into healed sockets. Immediate loading of implants placed into fresh extraction sockets should not be done routinely (p. 31).

Grade C, Level 2++

Loading protocol/timing

Edentulous mandible

A Root-form endosseous implants (two or four units) inserted for the purpose of retaining or supporting a removable dental prosthesis that are rigidly splinted together may be loaded immediately (p. 33).

Grade A, Level 1++

B Root-form endosseous implants (four or more units) inserted for the purpose of supporting a fixed one-piece full arch dental prosthesis may be loaded immediately (p. 33).

Grade B, Level 2++

Edentulous maxilla

B Root-form endosseous implants (two or four units) inserted for the purpose of retaining or supporting a removable dental prosthesis should not be loaded immediately (p. 34).

Grade B, Level 2++

C Root-form endosseous implants (six or more units) inserted for the purpose of supporting a fixed one-piece full arch dental prosthesis may be loaded immediately (p. 34).

Grade C, Level 2+

Single tooth replacement

A Conventional loading of a single root-form endosseous implant inserted for the purpose of supporting a single crown is the loading protocol of choice. Immediate loading of a single root-form endosseous implant inserted for the purpose of supporting a single crown may be done with caution (p. 34).

Grade A, Level 1++

Multiple-tooth partial edentulous maxilla/mandible

B Conventional loading of multiple root-form endosseous implants inserted for the purpose of supporting a multiple-unit fixed prosthesis in the anterior or posterior maxilla/mandible is the loading protocol of choice. Immediate loading of multiple root-form endosseous implants inserted for the purpose of supporting multiple-unit fixed prosthesis in the anterior or posterior maxilla/mandible may be done with caution (p. 34).

Grade B, Level 2++

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3 P.I. Branemark, et al., Intra-osseous anchorage of dental prostheses. I. Experimental studies, Scandinavian Journal of Plastic and Reconstructive Surgery 3 (1969) 81–100.